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FAA APPROVED

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT
for Eurocopter Model AS 350 B2, B3 with Garmin G500H System

Registration Number: _____ Serial Number: _____

This supplement shall be attached to the Eurocopter AS-350 B2, B3 Rotorcraft Flight Manual when the Garmin G500H Flight Display System has been installed in accordance with **STC No. SR09575RC.**

The Information contained herein supplements or supersedes the basic Rotorcraft Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Rotorcraft Flight Manual.

FAA Approved By: _____
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TABLE OF CONTENTS

SECTION 1. GENERAL 5
1.1 System Description 5
1.2 System Power Sources 6
1.3 Navigation Sources 6
1.4 Helicopter Synthetic Vision Technology (Optional) 6
1.5 Audio Panel 8
1.6 Interfaced Equipment 8
1.7 Traffic Display and Control (Optional) 9
1.8 XM Data link (Optional) 9
1.9 Video Input (Optional) 9
1.10 Iridium Data link (Optional) 9
1.11 Radar Altimeter (Optional) 9
1.12 Database Cards 10
1.13 System Description 10
1.14 Pitot-Static System 10
SECTION 2. LIMITATIONS 12
2.1 Types of Operation 12
2.2 Cockpit Reference & Pilot's Guides 12
2.3 System Software Requirements 12
2.4 Databases 13
2.5 AHRS Operational Area 13
2.6 AHRS Operation 13
2.7 Maximum Airspeed 14
2.8 Navigation Angle 14
2.9 Course Pointer Auto Slewing 14
2.10 Helicopter Synthetic Vision Technology (HSVT) 14
2.11 Terrain and Obstacle Display 15
2.12 Datalinked Weather Display 15
2.13 Traffic Display 15
2.14 Equipment Requirements 15
2.15 Placards 16
SECTION 3. EMERGENCY PROCEDURES 17

3.1 Loss of Electrical Power 17
3.2 Malfunction Indications and Procedures 17
SECTION 4. NORMAL PROCEDURES 22
4.1 PFD Knob & PFD Soft Keys 22
4.2 MFD Knobs & MFD Soft Keys 22
4.3 Helicopter Synthetic Vision Technology (HSVT) 23
4.4 HSVT Terrain 23
4.5 Altitude Alerter 23
SECTION 5. PERFORMANCE 24
SECTION 6. WEIGHT AND BALANCE 25

TABLE OF FIGURES

Figure 1-1- GDU 620 PFD/MFD Displays 5
Figure 1-2- Typical HSVT Display 7
Figure 1-3 – G500H Flight Display System Block Diagram 11

SECTION 1. GENERAL

1.1 System Description

The G500H Flight Display System consists of a Primary Flight Display (PFD) and Multi- Function Display (MFD) housed in a single Garmin Display Unit (GDU 620), an Air Data Computer (GDC 74H ADC) and Attitude and Heading Reference Systems (GRS 77H AHRS). The G500H interfaces with a Garmin GNS 400W, 500W, or 480 series GPS/WAAS navigator and an audio panel. Optionally, the G500H may interface with other systems installed in the rotorcraft including a Garmin GTX330 transponder, TAS traffic system, GDL 69(A) satellite data link, video sources, radar altimeter and GSR 56 Iridium data link.

The primary function of the PFD is to provide attitude, heading, air data and navigation information (from GNS units) to the pilot. The primary function of the MFD is to display supplemental data including mapping, terrain, video, charts, and flight plan information.

Figure 1-1- GDU 620 PFD/MFD Displays

The standby instruments (airspeed, altimeter and magnetic compass) are completely independent from the PFD and will continue to operate in the event the PFD is inoperative. These standby instruments should be included in the pilot's normal instrument scan and must be utilized if the PFD data is in question.

1.2 System Power Sources

The G500H system depends on electrical power to function. The Garmin Display Unit (GDU), Attitude and Heading Reference System (AHRS), and Air Data Computer (ADC) are connected to the aircraft main bus.

The major components of the G500H are circuit breaker protected with push-pull type circuit breakers available to the pilot. These breakers are located in the pedestal (30 α) circuit breaker panel and are labeled as shown in Table 1-1.

Table 1-1

Label	Unit Controlled
PFD	Garmin Display Unit (PFD/MFD), GDU 620
AHRS	Attitude and Heading Reference System, GRS 77H
ADC	Air Data Computer, GDC 74H

1.3 Navigation Sources

The G500H requires at least one Garmin GPS/WAAS navigation unit to be installed to ensure the integrity of the Attitude and Heading Reference System. The AHRS will still operate in reversionary mode if all GPS sources fail, and the PFD attitude display will still be presented.

The HSI on the G500H can display course deviation information from up to four sources: GPS 1, GPS 2, VLOC 1, or VLOC 2. (IF NAV 2 source is compatible with G500H). In addition, the HSI can display two simultaneous bearing pointers sourced from GPS 1, GPS 2, VLOC 1, VLOC 2.

1.4 Helicopter Synthetic Vision Technology (Optional)

HSVT uses an internal terrain database and GPS location to present the pilot with a synthetic view of the terrain and obstacles in front of the aircraft. The

purpose of the HSVT system is to assist the pilot in maintaining situational awareness with regard to the terrain and traffic surrounding the aircraft. A typical HSVT display is shown in Figure 1-2.

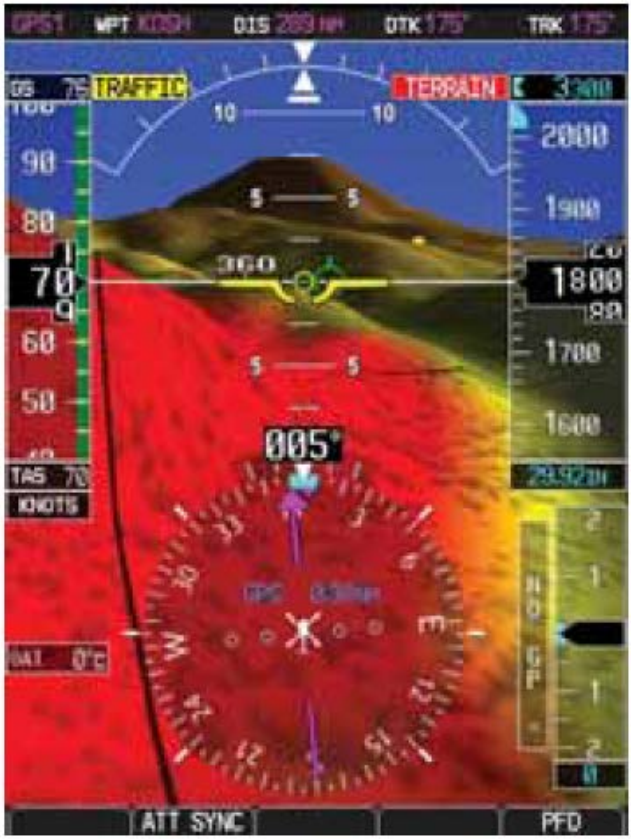

Figure 1-2- Typical HSVT Display

HSVT provides additional features on the G500H primary flight display (PFD) which include the following information:

- **Synthetic Terrain**; an artificial, database derived, three dimensional view of the terrain ahead of the aircraft within a field of view of approximately 25 degrees left and 25 degrees right of the aircraft heading.

• **Obstacles**; obstacles such as towers, including buildings that are within the depicted synthetic terrain field of view.

• **Flight Path Marker (FPM)**; an indication of the current lateral and vertical path of the aircraft. The FPM is displayed when synthetic terrain is selected for display and ground speed is more than 30 knots.

• **Horizon Line**; a white line indicating the true horizon is always displayed on the SVT display.

• **Horizon Heading**; a pilot selectable display of heading marks displayed just above the horizon line on the PFD.

• **Airport Signs**; pilot selectable "signposts" displayed on the synthetic terrain display indicating the position of nearby airports that are in the G500H database.

• **Runway Highlight**; a highlighted presentation of the location and orientation of the runway(s) at the destination airport.

• **Traffic (Optional)**; a display on the PFD indicating the position of other aircraft detected by a traffic system interfaced to the G500H system. The synthetic terrain depiction displays an area approximating the view from the pilot's eye position when looking directly ahead out the windshield in front of the pilot. Terrain features outside the field of view are not shown on the display.

The synthetic terrain display is intended to aid the pilot awareness of the terrain and obstacles in front of the aircraft. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles. The synthetic vision elements are not intended to be used for primary aircraft control in place of the primary flight instruments.

1.5 **Audio Panel**

The G500H Flight Display System is interfaced with the audio panel installed in the rotorcraft to provide aural altering generated by the G500H.

1.6 **Interfaced Equipment**

The G500H Flight Display System is designed to interface with other avionics systems including:

TIS Traffic

TAS Traffic

GDL 69 XM Data link

Video

GSR 56 Iridium Data link

GNS 400W or 500W Series Navigator

Radar Altimeter System

1.7 **Traffic Display and Control (Optional)**

The G500H Flight Display System can display traffic from various sources including TIS data from the Garmin GTX Series Mode-S Transponders or TAS data from various active traffic awareness systems. The information from these systems is displayed on and controlled through the MFD. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and is not to be utilized for aircraft maneuvering. When TAS traffic is installed TIS must be disabled.

1.8 **XM Data link (Optional)**

The G500H Flight Display System can display weather data from a Garmin GDL69 or GDL69A XM satellite receiver. Graphical and textual weather information is displayed on and controlled through the MFD. If the G500H is interfaced to a Garmin GDL 69A XM satellite receiver then control of audio entertainment can be performed through the MFD.

1.9 **Video Input (Optional)**

The G500H Flight Display System can display images from up to 2 video inputs. Video images are displayed on the MFD. The G500H does not provide a means to control the video source; however the digital images from the video source can be adjusted using the G500H.

1.10 **Iridium Data link (Optional)**

The G500H Flight Display System can automatically report the rotorcraft position when interfaced with a Garmin GSR 56 Iridium Data link. Position reports are controlled through the MFD.

Datalink weather is also available via the Garmin GSR 56 Iridium Transceiver. The control and display of Iridium satellite weather on the MFD is similar to XM weather.

1.11 **Radar Altimeter (Optional)**

The G500H supports the display of radar altitude on the PFD from supported radar altimeters. Radar altitude minimums alerting can be controlled through the MFD.

1.12 **Database Cards**

The G500H utilizes several databases. Database titles display in yellow if expired or in question (Note: the G500H receives the calendar date from the GPS, but only after acquiring a position fix.). Database cycle information is displayed at power up on the MFD screen, but more detailed information is available on the AUX pages. Internal database validation prevents incorrect data from being displayed.

The upper Secure Digital (SD) data card slot is typically vacant as it is used for software maintenance and navigational database updates. The lower data card slot should contain a data card with the system's terrain / obstacle information and optional data including Safe Taxi, FliteCharts and ChartView electronic charts.

1.13 **System Description**

Reference Garmin G500H PFD/MFD System Cockpit Reference Guide P/N 190-01150-03 for basic operational aspects of the system. For a complete detailed explanation of all the G500H's capabilities see the G500H Pilot's Guide P/N 190-01150-02.

1.14 **Pitot-Static System**

The pitot-static system supplies pitot-static pressure to the GDC 74H, standby altimeter, and standby airspeed indicator.

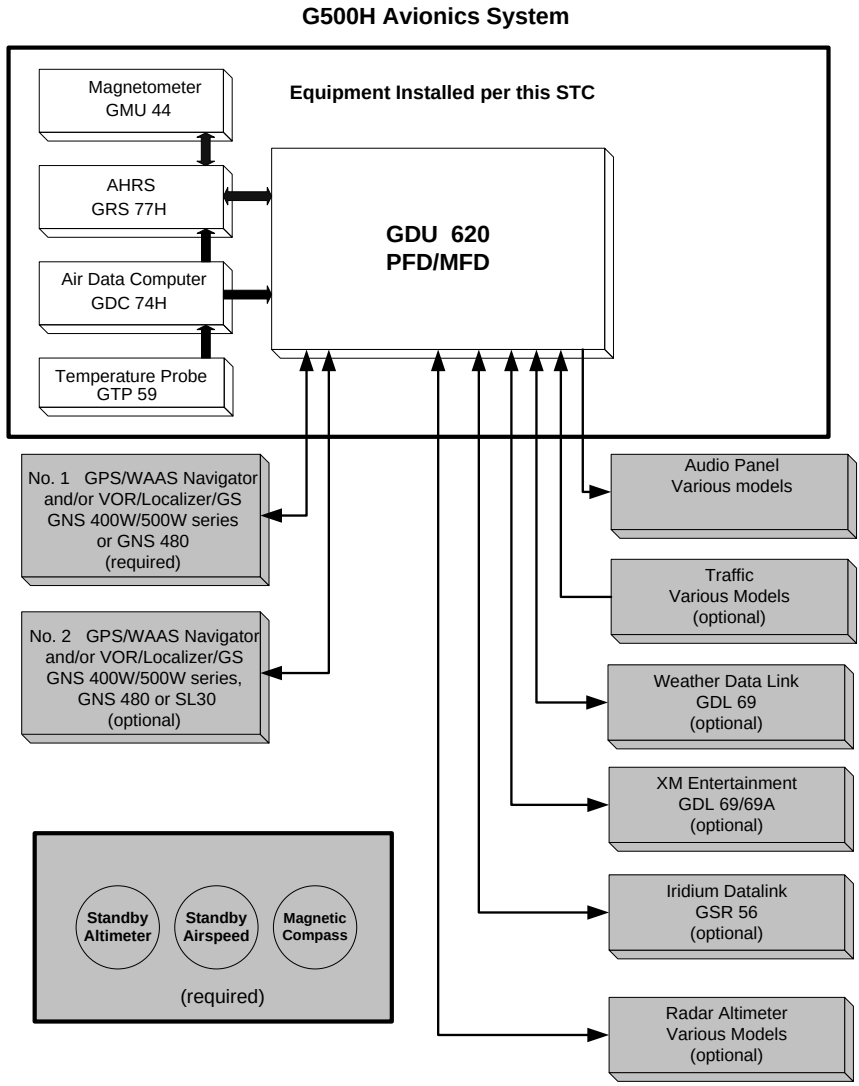

Figure 1-3 – G500H Flight Display System Block Diagram

SECTION 2. LIMITATIONS

2.1 Types of Operation

Rotorcraft equipped with the G500H Flight Display System are limited to VFR ONLY operations in accordance with Title 14 Code of Federal Regulations Part 91 and Part 135.

2.2 Cockpit Reference & Pilot's Guides

Garmin G500H Cockpit Reference Guide P/N 190-01150-03, Revision A or later appropriate revision must be immediately available to the flight crew.

2.3 System Software Requirements

The G500H must utilize the following approved software versions found in table 2-1:

Table 2-1 G500H Software Versions

Component	Identification	Software Version (or later FAA approved)
GDU 620	PFD/MFD	5.00
GRS 77H	AHRS	3.51
GDC 74H	Air Data Computer	3.06
GMU 44	Magnetometer	2.05

In addition to the main components of the G500H, at least one Garmin GPS/WAAS navigator must be interfaced to the G500H. Any GPS/WAAS systems connected to the G500H must utilize the applicable software versions found in table 2-2:

Table 2-2 GNS Navigator Required Software Version

Component	Identification	Software Version (or later FAA approved)
GNS 400W Series	GPS/WAAS NAV	3.30
GNS 500W Series	GPS/WAAS NAV	3.30
GNS 480/CNX80	GPS/WAAS NAV	2.2

2.4 **Databases**

The terrain databases are updated periodically and have no expiration date. Coverage of the terrain database is between North 75° latitude and South 60° latitude in all longitudes. The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. Coverage of the obstacle database includes the United States and Europe. This database is updated on a 56-day cycle.

The Garmin SafeTaxi database contains detailed airport diagrams for selected airports.

These diagrams aid in following air traffic control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

The Jeppesen ChartView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, ChartView will no longer function.

2.5 **AHRS Operational Area**

The GRS 77H AHRS used in the G500H is limited in its operational area: AHRS Operation is not assured north of 72°N and south of 70°S latitudes. In addition, AHRS operation is not assured in the following four regions:

1) North of 65° North latitude between longitude 75° W and 120° W

2) North of 70° North latitude between longitude 70° W and 128° W

3) North of 70° North latitude between longitude 85° E and 114° E

4) South of 55° South latitude between longitude 120° E and 165° E

Loss of the G500H heading and attitude may occur near the poles, but this will not affect the GPS track.

2.6 **AHRS Operation**

The GRS 77H AHRS uses GPS data, air data, and magnetometer inputs to improve availability. The GRS 77H will operate in reversionary modes that do not require these inputs.

When operating in no magnetometer or no magnetometer/no air data modes rapid pitch or roll movements may result in temporary loss of attitude indication.

2.7 **Maximum Airspeed**

The airspeed markings on the G500H PFD match those on the standby indicator regardless of operating altitude. This rotorcraft was originally equipped only with a placard for determining maximum airspeed based on altitude; that placard remains as the means to determine maximum airspeed.

2.8 **Navigation Angle**

The GDU 620 Navigation Angle can be set to either True or Magnetic on the AUX page. The Navigation Angle defines whether the GDU 620 headings are referenced to True or Magnetic North. The Navigation Angle set in the GDU 620 must match that which is set on the GNS navigators.

2.9 **Course Pointer Auto Slewing**

The G500H HSI will auto slew, i.e. automatically rotate the GPS course pointer to the desired course defined by each GPS leg. The system will also auto slew the VHF NAV course pointer when the CDI transitions to a LOC setting if an ILS, LOC, LOC BC, LDA, or SDF approach is activated in the GPS/WAAS navigator.

The VHF NAV (green) course pointer will only auto slew if the approach is active in the navigator, the LOC frequency is loaded in the active NAV frequency, and *then* the HSI source is changed to the corresponding VHF NAV for the approach. Back Course approaches will auto slew to the reciprocal course.

The system is not capable of automatically setting the inbound VHF NAV course pointer if an approach is not active in the GNS Navigation System.

The pilot should always double check the inbound course pointer prior to initiating any transition on any VHF NAV approach. Auto slewing the VHF NAV course pointer to the correct selected course is a database dependent function.

2.10 **Helicopter Synthetic Vision Technology (HSVT)**

The unaided use of the synthetic vision display for aircraft control, navigation or obstacle/terrain/traffic avoidance, without reference to G500H primary flight instruments and/or the aircraft standby instruments is prohibited.

2.11 **Terrain and Obstacle Display**

Terrain elevation information can be selected for display on the MFD as red, orange, yellow, green, and black tiles. Obstacles are displayed in red, yellow, and gray towers. The information is depicted for advisory purposes only and is not to be used for aircraft maneuvers or navigation. Terrain HSVT alerts are not equivalent to warnings provided by HTAWS.

2.12 **Datalinked Weather Display**

XM weather data is provided by an optional GDL 69 or GSR 56 interface. The weather information display on the MFD of the G500 is limited to supplemental use only and may not be used in lieu of an official weather data source.

2.13 **Traffic Display**

Traffic may be displayed on the G500H System from TIS or TAS systems. These systems are capable of providing traffic monitoring and alerting to the pilot. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and is not to be utilized for aircraft maneuvering.

CAUTION

Some TAS traffic systems may not automatically transition to OPERATE mode upon becoming airborne or in the event of a power interruption while in the air may power on in STANDBY mode. The pilot must be aware of the operating status of the TAS traffic system by referring to the traffic icon on the map pages or the status annunciator on the traffic page. If the traffic system is in STANDBY mode use the traffic page softkeys to change to the OPERATE mode.

2.14 **Equipment Requirements**

Table 2-3 lists the minimum fully functional G500H System Elements required for VFR flight operations:

Table 2-3 Equipment Requirements

Equipment	Number Installed	VFR
Primary/ Multi Flight Display	1	0
Attitude/ Heading Unit (AHRS)	1	0
Air Data Computer (ADC)	1	0
Magnetometer	1	0
Standby Altimeter	1	1
Standby Airspeed	1	1
Magnetic Compass	1	1
GNS 400W, 500W or 480 series navigator	1	0

2.15 **Placards**

If NAV 2 system is not compatible with G500H, NAV 2 must be labeled “NAV 2 NOT DISPLAYED ON THE G500H” unless otherwise displayed on a separate unit.

SECTION 3. EMERGENCY PROCEDURES

3.1 Loss of Electrical Power

In th e event of a total loss of electrical power, the G500H system will cease to operate and the pilot must utilize the standby instruments and visual references to fly the aircraft

3.2 Malfunction Indications and Procedures

These procedures supersede those presented as markings or placards, or documented in the aircraft's FAA approved Rotorcraft Flight Manual as a result of the installation of the G500H system. All other emergency procedures remain in effect.

Primary Flight Display

If primary flight information (Heading, Altitude or Airspeed) on the PFD is not available or appears invalid, utilize the standby instruments installed as required.

AHRS Failure

A failure of the Attitude and Heading Reference System (AHRS) is indicated by a removal of the sky/ground presentation, a red X over the attitude indicator, and a yellow "AHRS FAILURE" shown on the PFD. A heading failure will also be indicated.

1. Use visual references for aircraft control

2. Set course datum using CRS selection of the PFD knob

The Attitude, Heading and Reference System (AHRS) requires at least one GPS *or* air data input to function properly. In the unlikely event that GPS data *and* air data is not received by the AHRS, the system will not provide Attitude, Heading, Altitude, or Airspeed information; however, if the PFD is receiving valid GPS information, the reversionary data on the PFD provides GPS Track and GPS Altitude data along with course information and deviations which are still valid and may be used to navigate.

Heading Failure

A magnetometer failure is indicated by a HDG with a red X over it just to the left of the heading display. If the GDU 620 is still receiving valid GPS ground track from the GNS navigator, the heading will be replaced with GPS ground track in magenta. The aircraft can be flown by reference to GPS ground track instead of heading.

A complete Heading Failure (magnetometer and GPS ground track failure) is indicated by the digital heading presentation being replaced with a red X and the compass rose digits being removed. The course pointer will indicate straight up and operate much like a traditional CDI, with the Omni-Bearing Selector being adjusted by the PFD knob set to CRS. Under this condition, the pilot must use the standby compass.

Air Data Computer (ADC) Failure

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some derived functions, such as true airspeed and wind calculations, will also be lost.

1. Use Standby Airspeed and Altimeter, visual references, and secondary cues

Navigation

If navigation information on the PFD/MFD (HSI, RMI, WPT bearing and distance information, or Moving Map Data) is not available or appears invalid, select an alternate data source (via CDI key or 1-2 key) or utilize the data directly from the navigation equipment as required.

If GPS position information from the GPS WAAS navigator is not valid, the own-ship icon on the MFD is removed and "NO GPS POSITION" text is overlaid on the MFD moving map. The system will annunciate a loss of integrity, "LOI" on the HSI. The LOI annunciation will be colored yellow and the HSI needle will flag. The pilot should select an alternate navigation source (via CDI key or 1-2 key). Pressing the CDI soft key will change the HSI navigation source. If GPS navigation is subsequently restored, the MFD moving map will display the own-ship icon, and the HSI navigation source may be selected to GPS; at that time the "LOI" annunciation will be removed.

Synthetic Vision

The synthetic vision display of terrain uses several data sources (GPS, terrain database, attitude information, etc.) in order to accurately display terrain. If any of these data sources become unreliable or unavailable, the display of synthetic terrain will automatically revert to the non-SVT PFD display of blue over brown. Additionally, if during the course of normal operations there is any discrepancy between actual terrain around the aircraft and terrain shown on the SVT display, the display of synthetic vision should be manually turned off using the procedure in section 4.3 of this flight manual supplement.

Display Dimming

When operating at high Outside Air Temperatures, typically in excess of 20°C, the GDU 620 display may automatically dim to reduce equipment temperatures. The display will return to full brightness when operating temperatures are reduced.

Warnings, Cautions, and Advisory Annunciations

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G500H displays.

NOTE:

The G500H Cockpit Reference Guide and the G500H Pilot's Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

Table 3-1 Warning Annunciations – Red

Annunciation	*Pilot Action*	*Cause*
ATTITUDE FAIL	Use visual references	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area
AIRSPEED FAIL	Use Standby Airspeed	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Use Standby Altitude	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPD FAIL	Cross check instruments	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display
HDG	Use Standby Magnetic Compass or GPS track information	Display system is not receiving valid heading from the AHRS; accompanied by a red X through the digital heading display.
Red X	Reference the data source or alternate equipment	A red X through any display field indicated that display field is not receiving data or is corrupted.
TERRAIN	Visually acquire the terrain and avoid	SVT Terrain has determined that a nearby terrain poses a collision hazard.
OBSTACLE	Visually acquire the obstacle and avoid	SVT Terrain has determined that a nearby obstacle poses a collision hazard.

Table 3-2 Caution Annunciations – Yellow

Annunciation	*Pilot Action*	*Cause*
AHRS Aligning-Keep Wings Level	Limit rotorcraft bank to less than 10 degrees as AHRS Aligns	Attitude and Heading Reference System is aligning. Keep attitude level using outside references. AHRS will not align if bank angle remains over 10 degrees.
NO GPS POSITION	If the system is configured with dual GPS, press the 1-2 button	GPS data on the selected system is no longer valid. The Moving Map and associated data are not updating.
TRAFFIC	Visually acquire the traffic to see and avoid	The configured traffic system has determined that nearby traffic may be a threat to the aircraft.
No Traffic Data	Use vigilance, as the traffic sensor is not able to detect traffic	The configured traffic system is not able to detect traffic and/ or provide the pilot with any traffic awareness.
TERRAIN	Visually acquire the terrain and avoid	SVT Terrain has determined that nearby terrain may pose a collision hazard.
OBSTACLE	Visually acquire the obstacle and avoid.	SVT Terrain has determined that a nearby obstacle may pose a collision hazard.

Table 3-3 Advisories – White

Annunciation	*Pilot Action*
Various Alert Messages may appear under the MFD-ALERTS soft key.	View and understand all advisory messages. Typically that indicates communication issues within the G500H System. Refer to the G500H Cockpit Reference for the appropriate pilot or service action.

SECTION 4. NORMAL PROCEDURES

Refer to the Garmin G500H PFD/MFD System Cockpit Reference Guide P/N 19001150-03 or G500H Pilot's Guide P/N 190-01150-02, for detailed operating procedures. This includes all Primary Flight Display and Multi-Function Display information.

Although intuitive and user friendly, the G500H PFD/MFD System requires a reasonable degree of familiarity to avoid becoming too engrossed at the expense of situational awareness. Pilots should take full advantage of training tools to enhance familiarity with the G500H system.

4.1 PFD Knob & PFD Soft Keys

The basic PFD controls are adjacent to and beneath the PFD display. The rotary knob performs the function annunciated on the display just to the upper left of the HSI: HDG, CRS, ALT, V/S, or BARO. If no function is annunciated, the knob is providing a HDG function. Assigning the function of the knob is done by pressing/releasing one of the dedicated function buttons adjacent to the PFD. The knob defaults back to HDG if it is not rotated for a period of 10 seconds. The Garmin G500H PFD/MFD System Cockpit Reference describes each function and its operation.

The soft keys at the bottom of the PFD display are used to configure the course data displayed in the HSI (CDI button, 1-2 button) and select the optional bearing pointers (BRG1 and BRG2 button) which may be overlaid in the HSI presentation on the PFD. The soft keys operate by press and release.

The ATT SYNC soft key synchronizes the miniature aircraft symbol to the horizon line at the time it is pressed. Pressing the soft key again will return the miniature aircraft symbol to its zero reference. When ATT SYNC is active small marks will appear at the outboard edges of the attitude display that show the zero reference.

The units and markings on the PFD are not user configurable. They match the units as specified in the aircraft's FAA approved Rotorcraft Flight Manual and standby instruments. Display and control of the airspeed references are made via the AUX page of the MFD; consult the Garmin G500H Cockpit Reference Guide for description and operation of these references.

4.2 MFD Knobs & MFD Soft Keys

The MFD controls are adjacent to and beneath the MFD display. The rotary knobs are used to scroll through various pages/page groups of the MFD. Pressing the knob will activate a cursor and allow for the user to enter data and manipulate settings.

Keys at the bottom of the display allow for the rapid selection of pre-defined functions to be performed on each page. The soft keys operate by press and release. More detailed configuration is typically available by pressing the MENU button, located on the right side of the display. Pressing and holding down the CLR key will display the main map page on the MFD. Details of the functions available on the MFD are explained in the Garmin G500H Cockpit Reference Guide defined in Paragraph 1.1.

4.3 **Helicopter Synthetic Vision Technology (HSVT)**

The HSVT function may be turned on or off, as desired. To access the HSVT softkey menu, press the PFD softkey on the GDU 620, followed by the SYN VIS softkey. Synthetic vision terrain, horizon headings, and airport signs can be toggled on and off from this menu. Press the BACK softkey to return to the root PFD menu.

4.4 **HSVT Terrain**

When the G500H has SVT enabled aural and visual terrain and obstacle alerting will be provided by the Terrain HSVT function of the G500H system. Terrain HSVT modes (normal, RP, and inhibit) can be selected via softkey on the Terrain page on the G500H MFD.

4.5 **Altitude Alerter**

The Altitude Bug Setting will flash when approaching within 1000 feet of the selected altitude, and an audio tone is played when approaching or deviating within 200 feet of the selected altitude.

SECTION 5. PERFORMANCE

-No Change from Basic Flight Manual

SECTION 6. WEIGHT AND BALANCE

- No Change from the Basic Flight Manual.